REMARKS

The Office Action dated February 24, 2006 has been carefully reviewed and the foregoing remarks are made in response thereto. In view of the above claim amendments and following remarks, Applicants respectfully request reconsideration and reexamination of this application and timely allowance of the pending claims.

By this Amendment, claims 1-2, 6, 12 and 42-51 have been amended. Applicants submit that no new prohibited matter has been introduced by the amendments and that written support for the amendments can be found throughout the specification and in the original claims.

Summary of the Office Action

1. Claim 12 was objected to for improper grammar.
2. Claims 1, 2, 6, 25-28 and 42-51 were rejected under 35 U.S.C. § 112 (second) paragraph as being indefinite.
3. Claims 42 and 43 were rejected under 35 U.S.C. § 112 (first paragraph) for failing to comply with the written description requirement.
4. Claims 1-2, 12, 25-28 and 43-51 were rejected under 35 U.S.C. § 112 (first paragraph) as containing subject matter which was not adequately described in the specification.
5. Claims 42 and 49-51 were rejected under 35 U.S.C. § 112 (first paragraph) for lack of enablement.
6. Claims 1-12, 25-28, 43-51 were rejected under 35 U.S.C. § 112 (first paragraph) for lack of enablement.
7. Claims 1-2, 12, 25-28 and 42-53 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hamlett *et al.* and Daly *et al.* Claims 25-28 were further rejected under 35 U.S.C. § 103(a) as being unpatentable over Hamlett *et al.* and Daly *et al.* in further view of Lin *et al.*

Objection to Claim 12 should be withdrawn

Applicants have amended claim 12 to correct the grammatical error. In view of this amendment, Applicants request withdrawal of the objection.

Rejections under 35 U.S.C. § 112 (second paragraph) should be withdrawn

Claims 1, 2, 6, 12, 25-28, 42-51 were rejected under 35 U.S.C. § 112 (second) paragraph as being indefinite. Regarding the rejection of claim 6, Applicants note that claim 6 was previously properly amended to depend on claim 1 and as such is definite. Unfortunately, the strike-though was not perceived. To clarify the changes made to claim 6 by the previous amendment, for the sole purpose of advancing prosecution and without acquiescing to the merits of the rejection, Applicants have by amendment replaced the strike-through with double brackets (*i.e.*, [[4]]), rendering this rejection moot (see M.P.E.P. § 714). Therefore, Applicants respectfully request examination of claim 6.

The Examiner alleged that claims 1 and 52-53 and dependent claims 2, 12, 25-28, 42-51 are indefinite because of the phrase "capable of detoxifying" is used in these claims. Applicants respectfully submit that independent claims 1, 52-53 and dependent claims 2, 12, 25-28, 42-51 are definite. The present invention encompasses a *Deinococcus radiodurans* bacterium containing *mer* operon with a constitutive promoter. As such, a bacterium according to the invention is capable of detoxifying a heavy metal as long as the *mer* operon is expressed, a feature set forth in each of these claims. Therefore, claims 1, 52-53 are definite and the rejection of these claims under § 112 (second) paragraph should be withdrawn.

The Examiner alleged that claims 47, 49-51 are indefinite because of the use of the phrase "derivative thereof" in these claims. Applicants have amended claims 47 and 49-51 to remove the phrase "derivative thereof" for the sole purpose of advancing prosecution and without acquiescing to the merits of the rejection, rendering this rejection moot.

The Examiner alleged that claim 12 is indefinite because of use of the phrase "at least one protein encoded by a nucleic acid other than the mer operon." Applicants submit that the claim in light of the specification is definite. On its face, the claim includes any protein and the specification teaches particularly advantageous other proteins such as *e.g.* the protein encoded by *cytc3* (see Specification, Table 5 at page 23). The specification also discloses construction of such a bacterium (see Specification, Example 3, page 41, line 23 to page 45, line 1). Therefore, Applicants request withdrawal of the rejection.

Rejections under 35 U.S.C. § 112 (first paragraph) should be withdrawn

Claims 42 and 53 were rejected for allegedly failing to comply with the written description requirement. Purportedly, claims 42 and 53 add new matter. The Examiner alleges that claim 42 contains

new matter, as the specification purportedly does not describe *D. radiodurans* strain ATCC BAA-816. Applicants respectfully submit that *D. radiodurans* strain ATCC BAA-816 is inherently disclosed in the specification. The specification discloses *D. radiodurans* strain R1 (wild type) (see *e.g.* Specification at page 5, lines 13-15). *D. radiodurans* strain ATCC BAA-816 is *D. radiodurans* strain R1 that has been deposited with the ATCC. Therefore, ATCC BAA-816 is inherently disclosed in the specification and thus claim 42 complies with the written description requirement (see M.P.E.P. § 2163 (Newly added claim limitations must be supported by express, implicit, or inherent disclosure)).

Regarding claim 53, the Examiner purports that the radiation resistant, non-pathogenic bacterium as claimed is not described in the application. Applicants submit that the specification discloses many radiant resistant bacteria such as *Deinococcus radiodurans* strains, all of which are non-pathogenic. The specification discloses that "*D. radiodurans* is a non-pathogenic, desiccation resistant soil bacterium" (see Specification page 11, lines 23-24). Therefore, claim 53 meets the written description requirement. In view of these arguments, Applicants submit that the rejection of claims 42 and 53 is moot and request withdrawal of the rejection.

Claims 1-2, 12, 25-28 and 43-51 were rejected for containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the art that the inventors at the time of filing were in possession of the claimed invention.

The Examiner purports that the claims are drawn to "any or all *Deinococcus* bacteria transformed with a genus comprising any or all *mer operon*...wherein the resulting transformed bacteria detoxifies a genus comprising any or all heavy metals" (see page 7-8 of the Office Action). The Examiner then alleges that Example 2 purportedly only discloses transformation of one species of *D. radiodurans* and that therefore the specification does not reasonably convey to one skilled in the art that the inventors were in possession of the claimed subject matter.

Applicants respectfully disagree. The specification discloses the claimed-subject matter with more than reasonable clarity (see M.P.E.P. § 2163.02). As previously discussed, the specification discloses numerous species of *Deinococcus*, which can be transformed with the *mer* operon (see Specification at page 20, lines 7-16 and page 21, lines 3-12). The specification further discloses construction of *D. radiodurans* transformed with the *mer* operon (see Specification at Example 1 and Example 2, page 33, line 28 to page 41, line 22). Applicants have amended claims 1-2, 12, 25-28 and 43-51 to recite a *Deinococcus radiodurans* bacterium for the sole purpose of advancing prosecution and without acquiescing to the merits of the rejection. Transformed *D. radiodurans* is clearly disclosed in the

specification and therefore the specification conveys to one skilled in the art that the inventors are in possession of the claimed subject matter. In response to the Examiner's comments regarding disclosure of a representative number of species of the *mer* operon, Applicants submit that the disclosure is sufficient for the claimed genus of *mer* operons. The written description requirement merely requires that the description clearly allow persons of ordinary skill in the art recognize what is claimed (see M.P.E.P. 2163.02). As the *mer* operon is defined by function (*i.e.*, reduction of, and resistance to, mercury) and not structure across species, Applicants submit that the specification discloses all that is necessary for the skilled artisan to ascertain the scope of the claimed radiation resistant bacterium comprising a nucleic acid encoding at least one *mer* operon (see, for example, page 37, lines 11 to 14). In view of these arguments, Applicants submit that the rejection is moot and request withdrawal of the rejection.

Claim 42 and 49-51 were rejected under 35 U.S.C. 112 (first paragraph) for lack of enablement. Applicants respectfully submit that the claims are enabled (see *In re Lundak*, 774 F.2d 1216 (Fed. Cir. 1985)) (35 U.S.C. § 112 (first paragraph) does not require transfer of deposit of biological sample prior to filing of the patent application, deposit prior to issuance of the patent is sufficient). Applicants request that this rejection be held in abeyance as Applicants are in the process of obtaining the necessary deposit information.

Claims 1-12, 25-28, 43-51 were rejected under 35 U.S.C. § 112 (first paragraph) for lack of enablement. The Examiner alleges the specification is only enabling for radiation resistant *D. radiodurans* transformed to specifically express mercuric reductase as encoded by the mer operon (see Office Action at page 10-11). The Examiner then reasons, in light of this allegedly limiting disclosure, undue experimentation is required to enable one of skill in the art to practice the claimed invention. The Examiner buttresses this rejection by stating that only *D. radiodurans* and *D. geothermalis* are transformable.

Applicants respectfully disagree. Notwithstanding Examiner's comments to the contrary, the specification teaches one of skill in the art how to transform the listed species of *Deinococcae*. Brim *et al.* discloses that *D. radiodurans* and *D. geothermalis* are transformable and that *D. murrayi* has suitable properties for transformability (see Brim *et al.* at page 4581). Since the specification discloses numerous ways of making and using the claimed invention of claims 1-12, 25-28, 43-51, that bear a reasonable correlation to the entire scope of the claims, the enablement requirement is satisfied (see *In re Fisher*, 427 F.2d 833 (CCPA 1970)). For example, the specification discloses transformation of *D. radiodurans* with the *mer* operon (see Specification, page 37, lines 10 to 41). The specification further discloses a variety of

heavy metals that can be detoxified by bioremediation (see page 23, Table 5). The specification also discloses transformation of *D. radiodurans* with a toluene-metabolizing gene (see Specification, Example 3, page 41, line 23 to page 45, line 1). Nonetheless, Applicants have amended claims 1-2, 12, and 43-51 to recite a *Deinococcus radiodurans* bacterium for the sole purpose of advancing prosecution and without acquiescing to the merits of the rejection. It is not necessary that Applicants disclose every species (see *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991)) (not required to disclose every species in an unpredictable art). Furthermore, since there are only seven species of *Deinococcae* (see Brim *et al.* at page 4575), it would not be undue experimentation to transform other species in light of the transformation of *D. radiodurans* as disclosed in the Example 2 (see Specification, page 37, line 10 to page 41 line 22). It would certainly not be undue experimentation to make and use the invention as claimed, particularly since the examples in the specification teach one how to make a bacterium according to the claimed invention. In view of these arguments, Applicants submit that the rejection is moot and request withdrawal of the rejection.

Rejections under 35 U.S.C. § 103(a) should be withdrawn

Claims 1-2, 12, 25-28 and 42-53 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hamlett *et al.* and Daly *et al.* Claims 25-28 were also rejected under 35 U.S.C. § 103(a) as being unpatentable over Hamlett *et al.* and Daly *et al.* in further view of Lin *et al.*

The Examiner purports that it would have been obvious to transform *D. radiodurans* (Daily *et al.*) with a plasmid containing the *mer* operon (Hamlett *et al.*), which confers resistance to up to 100 μM mercury in *E. coli*, for application in contaminated waste sites.

Foremost, the Examiner has again maintained both rejections based upon obviousness under 35 U.S.C. § 103(a) and lack of enablement under 35 U.S.C. § 112 (first paragraph) on the same claims. The Examiner supports this position by identifying the enabling embodiments of the claim as being obvious (see Office Action at page 15) while disregarding the full scope and meaning of the claim as a whole. The Examiner has clearly erred in applying the standards relevant to each type of rejection because he has interpreted the claim differently in applying each statute and therefore not established a *prima facie* case of obviousness. Specifically, there must be a reasonable expectation of success in order to establish *prima facie* obviousness (see M.P.E.P. § 2143.02). If the claims as a whole (not the embodiments thereof selected by the Examiner) are not enabled by the specification, clearly there can be no reasonable

expectation of success in the cited references. For this reason alone, the rejection is improper and should be withdrawn.

Secondly, the proper inquiry for obviousness is whether the combination of references discloses each and every feature of the claim and whether the references suggest the invention and provide one of ordinary skill in the art with a reasonable expectation of success. *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991); *In re O'Farrell*, 853 F.2d 894 (Fed. Cir. 1988); *In re Royka*, 409 F.2d 981 (CCPA 1974); and M.P.E.P. § 2143.03. To assess whether an invention is obvious, "[t]he invention must be viewed not with the blueprint drawn by the inventor, but in the state of the art that existed at the time." *Interconnect Planning Corp. v. Feil*, 744 F.2d 1132 (Fed. Cir. 1985). In other words, obviousness cannot based on picking and choosing among isolated disclosures in the prior art (see *In re Fine*, 837 F.2d 1071, 1075 (Fed. Cir. 1985)).

Applicants submit the Examiner's rejection is a classic case of hindsight reconstruction of the prior art utilizing the Applicants' specification and claims as a framework for the Examiner's selection of references when there is no suggestion or motivation to combine the references. The Examiner bases the rejection on prior art corollaries to each of the elements of rejected claims, which as such cannot be used to defeat the patentability of the claimed invention (see *In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998)) ("rejecting patents solely by finding prior art corollaries for the claimed elements would permit an examiner to use the claimed invention itself as a blueprint for piecing together elements in the prior art to defeat the patentability of the claimed invention"). The use of impermissible hindsight is particularly evidenced by the Examiner's attempt to reconstruct the claims as amended with new references, where there is no motivation or suggestion to combine the references and no reasonable expectation of success.

Hamlett *et al.* studied the roles of MerT, MerP and MerC in Hg(II) resistance, Hg(II) binding and operon induction (see Hamlett *et al.* at pages 6377-6378). For these studies, Hamlett *et al.* constructed plasmids containing the *mer* operon (see Hamlett *et al.* at pages 6379-6380). Hamlett *et al.* fails to suggest or disclose use of the *mer* operon in *Deinococcus* species or any other bacteria capable of withstanding high doses of ionizing radiation. Hamlett *et al.* fails to disclose or suggest use of the *mer* operon in the presence of radiation. Hamlett *et al.* also fails to suggest or disclose use of the *mer* operon for bioremediation. In addition, Hamlett *et al.* fails to disclose or suggest use of a constitutive promoter for the *mer* operon.

Daly *et al.* studied the repair of chromosomal and plasmid DNA in *D. radiodurans* (see Daly *et al.* at page 3508). Daly *et al.* designed a self-replicating plasmid with which *D. radiodurans* was transformed

(see Daly *et al.* at pages 3509-3510). Daly *et al.* discloses that *D. radiodurans* containing a self-replicating plasmid is able to grow in the presence of continuous ionizing radiation. Daly *et al.* does not disclose that *D. radiodurans* with the *mer* operon is able to grow in the presence of continuous ionizing radiation. Daly *et al.* does not disclose or suggest use of the *mer* operon in its plasmids. Nor does the reference disclose or suggest the use of *D. radiodurans* in bioremediation. Nor does the reference disclose or suggest the use of *D. radiodurans* transformed with the *mer* operon in bioremediation.

For an obviousness rejection, the Examiner may not use the inventor's disclosure as a "road map" for selecting and combining prior art disclosures (see *ATP Corp. v. Lydall, Inc.*, 159 F.3d 534, 546 (Fed. Cir. 1998) ("Determination of obviousness cannot be based on hindsight combination")). Applicants respectfully submit that the Examiner has used the claims as a road map to select prior art references that disclose (1) the *mer* operon and (2) *D. radiodurans* and then asserted without any basis that the claimed invention was obvious.

Given the disclosure of Hamlett *et al.*, one of ordinary skill in the art would not be motivated to combine the *mer* operon into a plasmid of Daly *et al.* to transform *D. radiodurans*. Neither reference suggests or provides any motivation that *D. radiodurans* could even be used for bioremediation. Nor is there any reasonable expectation of success of either using the *mer* operon in the plasmid of Daly *et al.* or using a *D. radiodurans* transformed with the *mer* operon for bioremediation. Nor is there any reasonable expectation of success of using *D. radiodurans* transformed with a *mer* operon under control of a constitutive promoter. Contrary to the Examiner's assertion, Daly *et al.* does not teach that *D. radiodurans* with the *mer* operon is able to grow in the presence of continuous ionizing radiation. Thus, there is no motivation to combine the cited references in the absence of the Applicant's disclosure. Hamlett *et al.* and Daly *et al.* do not render claims 1-2, 12, 25-28 and 42-53 obvious (see *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991)).

The Examiner further rejected claims 25-28 as being obvious in light of Hamlett *et al.* and Daly *et al.* in further view of Lin *et al.* Since claims 25-28 are not obvious in light of Hamlett *et al.*, for the reasons set-forth above, these claims are also not obvious in further view of Lin *et al.* Lin *et al.* does not disclose use *D. radiodurans* nor does it provide any suggestion to use *D. radiodurans*. Nor does Lin *et al.* disclose or suggest use of film-forming agents. Therefore Lin *et al.* cannot render claims 25-28 obvious.

In view of these arguments, Applicants submit that the rejection is moot and request withdrawal of the rejection of claims 1-2, 12, 25-28 and 42-53 under 35 U.S.C. § 103(a).

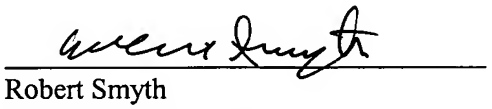
Conclusion

The foregoing amendments and remarks are being made to place the application in condition for allowance. Applicant respectfully requests reconsideration and entry of the amendments. A favorable action is awaited. Should the Examiner find that an interview would be helpful to further prosecution of this application, he is invited to telephone the undersigned at her convenience.

If there are any fees due in connection with the filing of this amendment, please charge the fees to our Deposit Account No. 50-310. If a fee is required for an extension of time under 37 C.F.R. 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Except for issue fees payable under 37 C.F.R. 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account 50-0310. This paragraph is intended to be a **constructive petition for extension of time** in accordance with 37 C.F.R. 1.136(a)(3).

Respectfully submitted
Morgan, Lewis & Bockius LLP



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